From Policy to Reality

Updated
^ Model Ordinances for Sustainable Development

2000
Environmental Quality Board

2008
Minnesota Pollution Control Agency

Funded by a Minnesota Pollution Control Agency Sustainable Communities Grant

Primary Authors:

CR Planning, Inc. Community Resources — Brian Ross

Desotelle Consulting, PLC — Diane Desotelle

Project Coordinator:

CR Planning, Inc. Community Resources

INTRODUCTION

Communities are frequently defined and sustained by the natural resource systems and natural heritage of their area. Woodlands, steep slopes and bluffs, native plant communities, game and non-game wildlife, wetlands, lakes, streams, and recreation areas in and around communities add substantial value to developed land uses. These natural resources define a positive community character, enhance the quality of life of residents, and support a variety of economic activities. Natural resources conservation provides ecosystem protection and economic sustainability for natural resource-based industries. Sustainable use of natural resources means that resources are protected in the development process for use by both current and future generations of residents and businesses.

This model ordinance provides example language for natural resource design standards. Just as communities adopt design standards for infrastructure and developed land uses, communities can adopt design standards for natural systems and resources. Roads that are built in a new subdivision must meet the minimum standards of the community. Wastewater and water systems similarly must meet standards that are intended to ensure a minimum level of performance. Natural resource design standards are intended to ensure that development results in acceptable performance or functioning of the community's natural systems.

Which natural resources to design for?

In order to create natural resource design standards the community must identify natural resource conservation goals. What natural systems and natural resources are of value to the community? What does the community want to protect? The three general steps to identifying your community's conservation goals are:

1. *Conduct an inventory.* A natural resource inventory (NRI) identifies the type and characteristics of the community's land cover and natural systems.

2. *Conduct an assessment.* A natural resource assessment (NRA) places value on the types and characteristics of the community's natural resources. This process can be conducted during a comprehensive planning effort, when other priorities are also being identified.

3. *Select conservation goals.* Based on the assessment, the community selects actions to address priority systems and resources. As with the NRA, the goal setting can be done as part of the community's comprehensive plan process. Even if done separately, the goals should be incorporated into the comprehensive plan.

Natural Resource Design Standards

These design standards are based on draft design standards written for the City of Shakopee. Shakopee's standards were based on the outcomes of a detailed natural resource inventory (NRI) and a natural resources assessment (NRA) process funded through the Minnesota Department of Natural Resources and the Bush Foundation. The community laid the foundation for creating natural resource design standards by first identifying natural resources and resource quality, then prioritizing natural resource characteristics to define what needed to be protected. The NRI/NRA process was also used in the City of Sartell, which provided the foundation for that city's natural resource protection ordinance.

Natural Resource Inventory/Assessment

For more detail on the NRI/NRA process in Shakopee, refer to ***Using Natural Resource Information in Comprehensive Planning,*** *which can be downloaded from http://files.dnr.state.mn.us/assistance/nrplanning/community/nrplanning_guide/handbook.pdf. A description of the handbook and a link to the DNR site may be found on the Minnesota Sustainable Communities Network website, www.nextstep.state.mn.us.*

Mapping Green Infrastructure for an Overlay District

Part of the planning process that results in an overlay district includes the community defining its "green infrastructure." Green infrastructure is a term that refers to the basic elements of the community's natural systems. Green infrastructure (woodlands, wetlands, native plant communities, parks, open space, etc) is distinguished from "gray" infrastructure (roads, buildings, and sewers). Both gray and green infrastructure are important community investments. Gray infrastructure, however, typically depreciates over time even with ongoing maintenance and ultimately must be rebuilt. Green infrastructure, in contrast, can appreciate in value with proper management (including careful integration of of development that sustains or restores the infrastructure). Like gray infrastructure, green infrastructure requires maintenance and investment, but works with nature toward a state of equilibrium. Communities should identify and prioritize green infrastructure in and adjacent to their boundary by completing an inventory of their natural resources, assessing each resource's functions and values, mapping priority areas, and providing language for the community's vision, goals, and policies to protect, restore, and sustain their natural resources.

After setting conservation goals, the community must define how to sustain these resources as the community develops and makes infrastructure choices. Defining the sustainable use of a community's natural resources will depend on several factors:

- The functional values of the resource to the ecological framework,
- The sensitivity of the natural resource to various uses and to different kinds of development,
- The uniqueness of the resource in the community and in the region,
- The economic value of the resource, and
- The natural resource priorities adopted by the community in its natural resource assessment or comprehensive plan.

The inventory/assessment/conservation goal process is identified in far more detail in several publications. The key point is that the community does not start by creating natural resource design standards. The community uses design standards to achieve specific conservation goals.

Use of Design Standards

Communities can use natural resource design standards to address natural resource protection and management in a community's development regulation in two ways: 1) coupling the standards to an overlay district, or 2) using the standards as general or performance standards. An overlay district identifies the natural resource areas that require protection on a map and sets protection requirements for those areas that lie in the overlay district as with a shoreland district or a historic district. Performance standards, in contrast, are written into the zoning ordinance to set protection requirements for priority natural resources or systems regardless of where the systems lie in the community.

Because Model Community is a generic community, this model ordinance language includes both overlay and community-wide performance standards. Reference is made throughout the standards to inventoried and mapped resources, assuming that an NRI/NRA process has been completed.

Performance Standards

Performance standards provide the design criteria and land use tools required for development in and around a community's natural resources based on Model Community's Comprehensive Plan, NRI and NRA. Performance Standards provide direction for natural resource protection, mitigation of development impacts, and protection of corridor connections necessary to preserve a series of natural features within an ecological framework. The local government references the performance standards in the zoning and/or subdivision ordinance. In addition, the standards may be referred to in other procedures (i.e., variances, conditional use permits, re-zonings, other administrative processes related to development) in order to look to improve other development or land use changes.

Natural Resource Design Standard Examples

The model natural resource design standards are directed at several specific types of resources, including woodlands, native upland plant communities, wildlife, and steep slopes and bluffs. Each performance standard is broken into four sections:

1) Purpose and goals,
2) Applicability, or areas subject to the performance standards,
3) Criteria for the performance standards, and
4) Required minimal performance standards.

Woodland Standards

These standards were specifically designed to meet a conservation goal of preventing woodlands from being cleared or partially cleared prior to development. Pre-development removal is thus strictly regulated, while allowing removal during the development process. This community's goal of minimizing fragmentation of remaining wooded areas will not apply to all communities. Some communities will want to focus on tree preservation (rather than woodlands), while others will want to protect wooded areas as habitat or natural heritage areas. Different conservation goals will require the use of different design standards.

Applicability

The model language assumes that tree removal is a precursor to development; woodland areas are defined as being large wooded undeveloped areas in an urban area with heavy development pressure.

I. Performance Standards for Woodlands

A. **Purpose and Goals** - The Model Community design standards for woodlands are established to protect Model Community's remaining important wooded areas as defined in the Model Community's Comprehensive Plan, natural resource inventory, and natural resource assessment. The design standards meet the following Comprehensive Plan goals:

1. **Goal** - Integrate development with natural resources to maximize value of both.
2. **Goal** - Minimize fragmentation of natural resource areas in Model Community.
3. **Goal** - Protect and restore water quality in Model community's lakes and streams.
4. **Goal** - Maintain Model Community's unique character, including neighborhoods, natural heritage, and historic buildings.

B. **Applicability** - The performance standards for woodlands shall apply to all woodland areas identified on Model Community's priority woodland areas and corridors map.

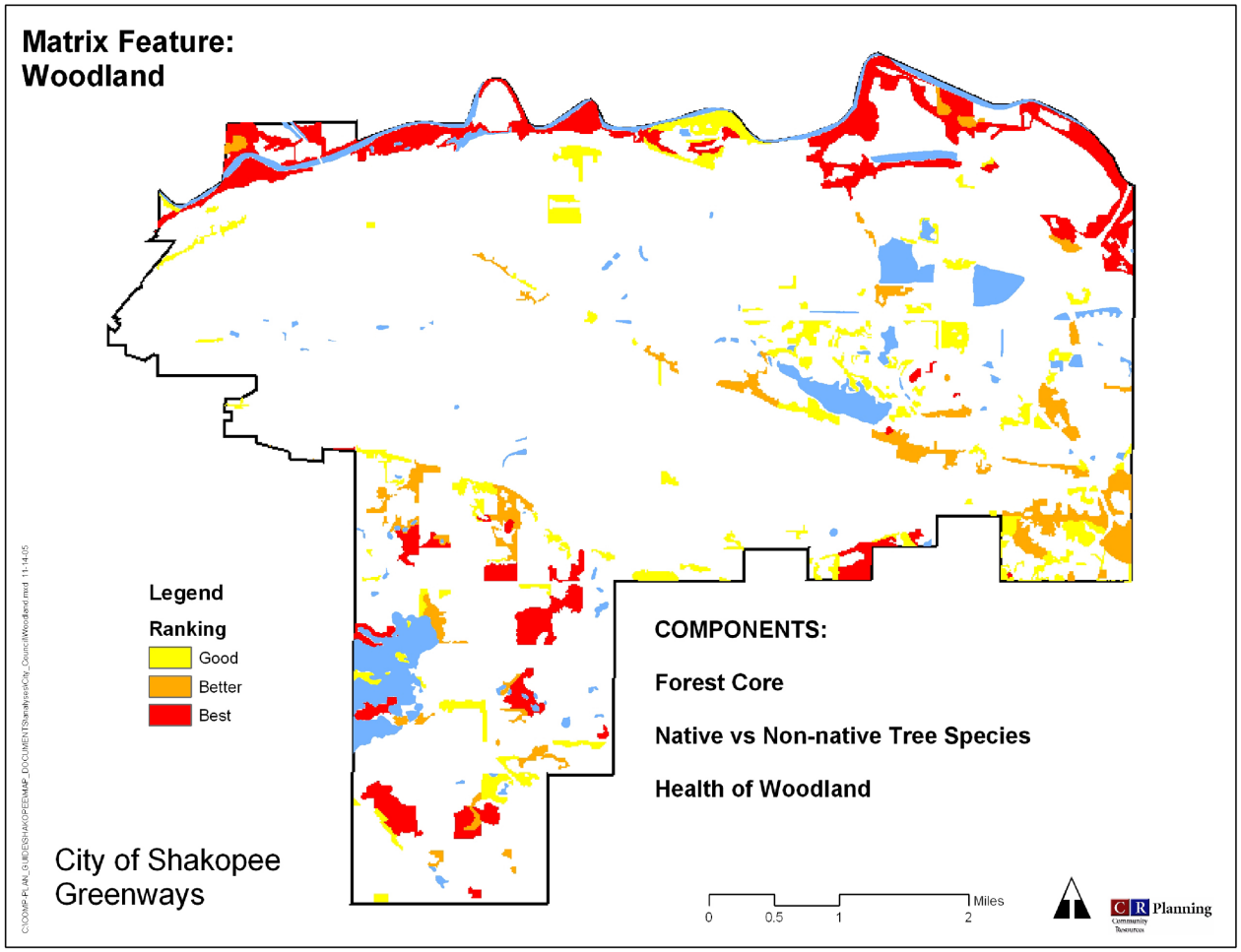
C. **Criteria for Standards** - The minimum performance standards for woodlands are created to meet one the following criteria:

1. **Large Wooded Areas** - The performance standard protects wooded areas that are large relative to all local tracts of remnant wooded areas; or
2. **Proximity** - The performance standard protects wooded areas that are in relative proximity to other wooded areas.

D. **Minimum Woodland Performance Standards** - The following minimum performance standards shall apply to woodland areas:

1. **Tree Removal Prior to Development Application is Prohibited** - The removal of any tree on any parcel of land containing a woodland area prior to approval of a Woodland Management Plan (see section D.3.e) is prohibited except for the removal of individual diseased or hazard trees for safety purposes. Failure to comply with this provision shall be considered a violation of this performance standard and shall be punishable by a fine up to an amount equivalent to the full cost of restoration, on or off-site, of woodland area equivalent in ecological function of trees that were removed.
2. **Site Design upon Submittal of Development Application** - Structures, driveways, and parking facilities shall be located in such a manner that the maximum number of trees should be preserved.

Figure 2: Example of the City of Shakopee's priority woodland areas as identified in the NRI/NRA process.



Ecological Considerations for Woodland Standards

According to Environmental Law Institute 2003, the following should be considered when defining woodland areas.

1. *The types of species in your community's woodland habitats (trees and wildlife) require areas (patches) of varying sizes to thrive. For example, an estimated five (5) acres is needed to sustain a representative tree community type and at least twenty-five (25) acres is needed to conserve an old growth forest if surrounded by secondary forest, or two hundred fifty (250) acres if surrounded by cleared land.*
2. *The core area of a patch is defined by the ratio of the perimeter of the patch edge to the interior area of the patch. A low ratio of edge to interior indicates more interior habitat available (core area). Certain plant and animal species require larger core areas to survive.*
3. *Certain species require a level of connectedness between woodland patches to thrive. The more connected woodland patches are to other habitats and woodlands, the better the chance at maintaining viable habitat. A series of small or medium sized patches may capture a greater diversity of habitat types and biological diversity than the preservation of one large fragment.*

Tree Removal Prior to Development Application is Prohibited

The model ordinance language is appropriate for urbanizing communities, but not for rural area or areas where development and working forests overlap. Provisions for timber harvest and would need to be added, a less stringent standard for what constitutes violation.

Woodland Management Plan Required

The community has set a very tight threshold for when a Woodland Management Plan is required. The goal for this community is to protect all remaining woodland areas until a development plan is submitted.

3. **Woodland Management Plan Required** - Any applicant who desires to remove any tree on any parcel of land containing a woodland must submit a Woodland Management Plan prepared by a certified forester or landscape architect to Model Community and must demonstrate that there are no feasible or prudent alternatives to removing any tree. Alternatives such as; decreased setbacks, minimized grading, reduction in the number of proposed dwelling units, reduction in street width or design, or other design modifications shall be considered. Increased costs alone shall not be sufficient proof of lack of feasible or prudent alternatives.
   a. **Information Required in Woodland Management Plan** - The Woodland Management Plan must consist of a survey or scaled drawing showing the following:
      i. Topography,
      ii. Parcel boundaries,
      iii. Waterbodies,
      iv. Tree inventory containing species, size at DBH, and condition (i.e. healthy, old growth, diseased, hazard, etc.)
      v. Proposed trees marked for removal,
      vi. Tree protection fencing around individual trees and/or woodlands during clearing or construction activities,
      vii. Existing and proposed streets, driveways, parking lots,
      viii. Existing and proposed building pads, structures, facilities,
      ix. Existing and proposed stormwater and wastewater infrastructure,
      x. Other information requested by Model Community.
   b. **Tree Removal to be Identified** - The drawing shall clearly illustrate individual trees proposed for removal and the manner by which the applicant intends to replace the removed trees in compliance with subsection 4, below (Tree Replacement Standards).
   c. **Pre-Development Plan Meeting** - The applicant is encouraged to meet with Model Community staff prior to the creation of a Woodland Management Plan to discuss subdivision design alternatives that meet the requirements of this section.
   d. **Proof Required for Requesting Tree Removal** - The proof required for an assertion that no feasible or prudent alternative to tree removal exists shall include, at a minimum, information on the following:

i. A description and site design of alternatives considered prior to the assertion of no feasible or prudent alternative;

ii. Cost estimates of alternatives that were considered; and

iii. Other information requested by the reviewing authority.

e. **Review by Expert** - Model Community may engage one or more experts to assist in the evaluation of an assertion that there are no feasible or prudent alternatives to removing any tree. An expert may be engaged to review biological information, cost estimates that are provided as proof of feasibility or prudence, or other reviews deemed necessary by Model Community to evaluate. Full costs of engaging such experts shall be charged to the applicant.

f. **Final Determination of Feasibility or Prudency** - Model Community shall make the final determination of whether or not feasible and prudent alternatives exist to tree removal.

4. **Tree Removal and Replacement Standards** - The following conditions shall apply to an applicant proposing to remove trees from any parcel of land for the purpose of development:

   a. Preserve fifty percent (50%) of the trees on the project site.

   b. Tree preservation areas must be equal to or greater than five acres.

   c. No tree replacement will be required if the above two requirements can be completed on site.

5. **Site Inspections Required** - Site inspections to ensure compliance must occur prior to the issuance of any permit for the development. The applicant must survey and stake all platted property lines, streets, parks, open spaces, building pads and install tree protection prior to site inspection. At least two additional site inspections shall occur during site preparation and construction of the development to ensure compliance with the approved Woodland Management Plan. Additional site inspections necessary because the applicants requested revisions to the approved Woodland Management Plan will be completed by Model Community and the costs shall be charged to the applicant and reimbursed from the construction security.

6. **Standards for Tree and Woodland Protection During Grading, Contouring, and Construction**

   a. All development activities, including grading and contouring, must take place in such a manner that the root zone aeration stability of existing trees are not affected and must provide existing trees with a protected watering area. The required protected watering area shall be measured as the distance of the branch that extends horizontally farthest from the trunk multiplied by 1.5.

Tree Removal and Replacement Standards

The standard allows for up to 50% removal as part of a development. This ordinance is not intended for permanent protection of habitat areas or working forests, but rather protection of community character and viewsheds.

Best Management Practices

The model ordinance references a best management practices manual appropriate for some communities. Other material is more appropriate for different types of communities, such as: City Trees: Sustainability Guidelines & Best Practices (Tree Trust, Bonestroo, 2007); Tree City USA, www.arborday.org/programs/treeCityUSA.

b. Installation of snow fencing or polyethylene laminate safety netting shall be placed at the drip line or at the perimeter of the critical root zone, whichever is greater, of trees and woodlands to be preserved. No grade change, construction activity, or storage of materials shall occur within the fenced area.

c. The applicant and the applicant's contractors shall take steps to prevent the change in soil chemistry due to concrete washout and leakage or spillage of toxic materials, such as fuels or paints. Washout areas must be identified on site and signage of those areas should be provided in the construction area.

d. Best management practices shall be followed for tree and woodland protection during site grading and construction. Model Community adopts by reference the best management practices in the most current version of *Conserving Wooded Areas in Developing Communities – Best Management Practices in Minnesota*, Minnesota Department of Natural Resources, Minnesota Shade Tree Advisory Committee, USDA Forest Service, Northeastern Area State and Private Forestry.

7. **Diseased Trees** - Trees determined to be diseased by Model Community will be required to be removed and such removals will not require replacement or count towards the approved removal quantity.

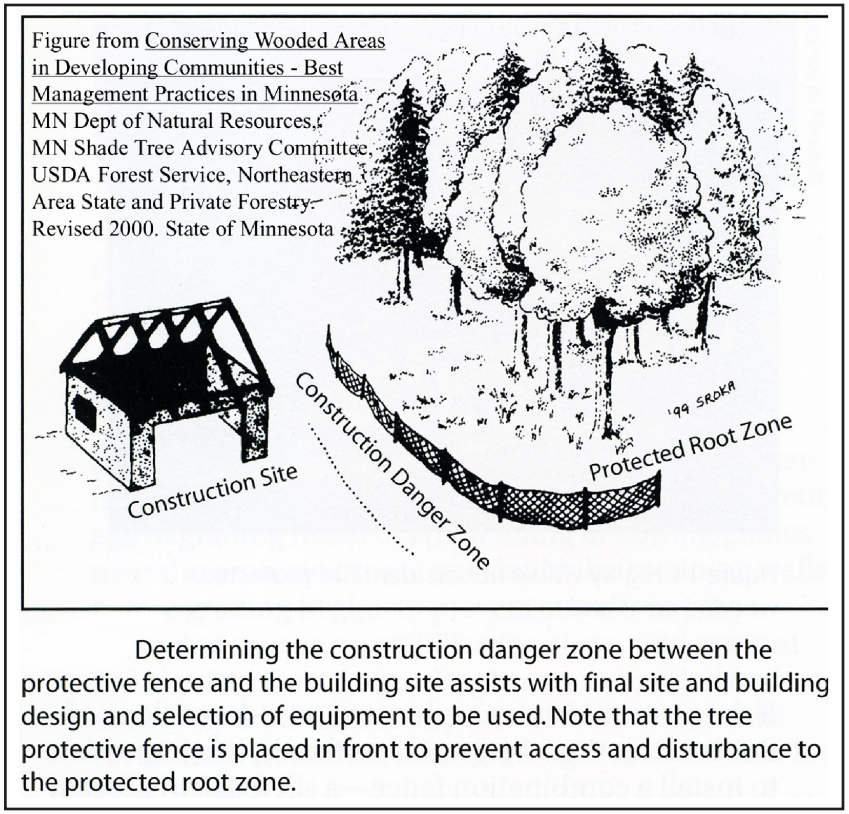
8. **Woodland Standards in Shoreland Areas** - Tree removal in shoreland areas is subject to the provisions of this section with the following additional requirements:

   a. A Woodland Management Plan shall not allow tree removal within the shoreland and bluff impact zones and on steep slopes in shoreland areas, except as allowed in c. below.

   b. Intensive vegetation clearing for conversion of forest land to another use is prohibited.

   c. In shoreland and bluff impact zones and on steep slopes, limited clearing of trees and shrubs and cutting, pruning, and trimming of trees is allowed to provide a view to the water from the principal dwelling site and to accommodate the placement of stairways and landings, picnic areas, access paths, beach and watercraft access areas, and permitted water-oriented accessory structures of facilities, provided that:

Figure 3: Tree protection fence installation



Determining the construction danger zone between the protective fence and the building site assists with final site and building design and selection of equipment to be used. Note that the tree protective fence is placed in front to prevent access and disturbance to the protected root zone.

i. The access path is no more than six feet wide through the buffer, and clearing along the shore is no more than 20 feet wide and 15 feet deep, consistent with shoreland performance standards;

ii. The screening of structures, vehicles, or other facilities as viewed from the water, assuming summer, leaf-on conditions, is not substantially reduced; and

iii. Existing shading of water surfaces is preserved to sustain cool water temperatures.

The above provisions (8. c.i – 8. c. iii) are not applicable to the removal of trees, limbs, or branches that are dead, diseased, or pose safety hazards.

9. **Security Required for Subdivision** - Prior to issuing a subdivision permit, the developer or subdivider of a site shall provide a financial guarantee for compliance with this chapter.

   a. The financial security shall be part of the standard construction security required for the guarantee of street and utility construction. Such security, which may be in the form of a bond, letter of credit, cash of escrow deposit, or other such instrument approved by Model Community.

   b. The applicant will be released of any further responsibility for loss of trees when:

      i. The building permit has been issued.

      ii. Grading is complete, replacement trees have been planted, and preservation is verified by the Model Community.

10. **Security Required for Builder** - Security shall be provided by builder in any designated woodland area to guarantee compliance with this chapter.

    a. Prior to the issuance of a building permit, the builder shall provide Model community with a cash escrow of $1,000 to guarantee compliance with tree preservation and replacement requirements.

    b. The builder shall be released of any further responsibility for loss of trees following an inspection and verification by Model Community that all such requirements have been met.

    c. The local government of Model Community shall be exempt from the provisions of this Section.

11. **Penalty for Unauthorized Tree Removal** - Any person, firm, or corporation who causes the loss of trees identified as saved on the approved Woodland Management Plan shall be required to complete one of the following:

Security Required

This model language requires the developer and the builder to put up financial assurance that the design standards will be met as required. By setting separate requirements for the developer and the builder, the ordinance acknowledges the distinct role for each in the development process, and limits responsibility for each.

a. **Replacement of the Tree Removed According to the Diameter of the Tree** - The replacement ratio shall be two (2) caliper inches for every one (1) caliper inch of the tree removed. Replacement trees shall be planted within the project site. If replacement can not be completed within the project site, a cash amount approved by Model Community shall be provided to Model Community to complete management activities within the development, plant trees on the site at a later time, or plant trees on public owned or managed property.

b. **Payment to Model Community from the Construction Security** - The amount of the payment will be $500 for every one (1) caliper inch of the tree removed.

12. **Plan is a Continuing Requirement** - The Woodland Management Plan shall be a continuing requirement. The survival of replacement trees and continuation of management practices required in the Woodland Management Plan shall be the responsibility of successor owners of the parcel or subdivided lots.

13. **Appeals** - If the applicant disagrees with Model Community staff decision with respect to the interpretation or enforcement of this Subdivision, the applicant may appeal that decision by following the procedure established by Model Community's code.

II. Performance standards for Native Upland Plant Communities

A. **Purpose and Goals**

1. **Protect Upland Native Plant Communities** - The primary purpose of the native upland plant community performance standards is to protect areas in Model Community with high quality non-woody native upland plant communities where proposed or existing development presents a risk to Model Community's remaining native habitat. The performance standards are also designed to allow restoration efforts to take place and to provide for connection of isolated exceptional or high value vegetation areas.
2. **Consistency with Comprehensive Plan** - Native upland plant communities identified in Model Community's NRI/NRA shall be preserved or restored during land development, consistent with the following Comprehensive Plan goals:
   a. Create appropriate development standards to protect or enhance Model Community's exceptional and high value ecosystems and rare plant communities.
   b. Protect areas critical for maintaining connectivity between high value communities that make up Model Community's natural heritage.
3. **Ecosystem Approach** - These performance standards adopt the goals of ecosystem management; the whole system is greater than the sum of all its parts. Development and protection decisions need to be based on understanding the inter-relationship of components of the ecosystem (i.e., woodlands, endangered species, wetlands, slopes, etc.). Individual components of the ecosystem, also referred to as green infrastructure, must frequently be connected in order to function appropriately, just as the individual components of the water, wastewater, and transportation systems must be connected in order to function.
4. **Integrate Development** - These performance standards are designed to integrate new development with Model Community's remaining native upland plant communities, and to ensure that these areas continue to function as part of the community's natural heritage, habitat, and open space into the future.

B. **Applicability** - The standards apply in the following areas when vegetative clearing is being conducted or an application for a grading or development permit is submitted:

1. **Priority Native Upland Plant Communities** - Native upland plant community areas as mapped and ranked by Model Community according to their functional value.

Protect Upland Native Plant Communities

This standard is written to protect upland plant communities. Unlike wetlands or shorelands, upland native vegetation has no state or federal protection. If the community prioritizes native prairie or oak savanna as an important part of it's natural heritage, the community must incorporate protections

Comprehensive Plan Language

Direct reference to comprehensive plan goals helps users understand the reason behind the regulation. Communities should put their own policy or goal language in place of the language provided.

Ecological Facts about Upland Plant Communities

"Tall grass prairies and related oak savannas are now the most decimated and threatened plan communities in the Midwest."

Source: Wisconsin's Biodiversity as a Management Issue – Chapter 8 Grassland Communities. Richard Henderson.

2. **Connection Areas** - Areas within the corridors as mapped that connect parcels with exceptional and high quality native upland plant communities.

C. **Criteria for Standards** - The minimum performance standards for exceptional and high quality native upland plant communities areas include the following :

1. **Protect and Connect High Quality Vegetation** - Protect exceptional and high quality native upland plant community areas, and other vegetated, undeveloped areas that connect to the exceptional and high quality native upland plant communities, within Model Community's corridor system.
2. **Protect Isolated Areas** - Protect exceptional and high quality vegetation areas outside the corridor system to the maximum extent practicable, requiring delineation of these vegetation areas and retaining 100% of sites smaller than five acres or less than 20% of the development site, plus a minimum of 50% of contiguous vegetation for that portion of the site beyond the five acre/20% threshold.
3. **Encourage Restoration** - Encourage (working with other organizations and willing landowners) or require (as a condition of subdivision, PUD, rezoning, or conditional use permits) restoration of moderate to low quality native upland plant communities areas consistent with an approved management plan.

D. **Minimum Performance Standards for Native Upland Plant Community Areas** - Following are the minimum performance standards that shall apply to the designated categories of native upland plant communities.

1. **Native Upland Plant Communities** - Exceptional and high quality native upland plant communities shall be protected and incorporated into new development or infrastructure so as to retain and maintain the integrity of Model Community's native upland plant communities, encourage restoration of those communities as needed, and provide for connections between distinct areas consistent with the needs to sustain the plant communit(ies).
2. **Delineation Required for Exceptional and High Quality Native Upland Plant Community Areas** - Applications for any development, grading, or clearing permit on or adjacent to parcels that include designated quality native upland plant communities must include a delineation of all native upland plant community areas on the development parcel, based on the MLCCS and consistent with the criteria used in Model Community's natural resource and corridor maps. The application shall also note the location of mapped exceptional and high quality native upland plant community areas on adjacent parcels.

Encourage Restoration

Most remaining remnants of savanna flora and fauna are in need of restoration, including tree thinning, brushing, and burning. In the absence of fire or grazing, savanna and brush-prairie communities rapidly succeed to woodland , which does not sustain the same habitat as the savanna and prairie.

Source: Henderson, Grassland Communities, 1995).

Exceptional, High, Moderate, Low Quality

These standards reference "high", "moderate" and "low" quality sites. Such designations must be defined in the community's NRI/NRA or in the Comprehensive Plan.

Alternatively, the community can use the quality standards embedded in the MLCCS inventory, to the extent that the specific resource (e.g. Native Upland Plant Communities) matches the MLCCS cover types. The MLCCS has criteria for assessing qualitative rankings. While judgement always comes into play, these rankings have been demonstrated to be reliable and consistently applied.

3. **Exceptional and High Quality Native Upland Plant Community Areas within the Corridor System** - Development is regulated in the following manner:
   a. **Development Prohibited** - No development, intensive vegetative clearing, or grading is allowed on any area within the corridor system that is designated as moderate to exceptional quality native upland plant communities except for vegetative restoration under a vegetative management plan approved by Model Community.
   b. **Edge Habitat Buffers Required** - Within 100 feet of the delineated high quality native upland plant communities sites:
      i. All buildings and roads are excluded.
      ii. Vegetative clearing is prohibited except for vegetative restoration that is described in a vegetative management plan approved by Model Community.
   c. **Restoration** - Restoration may be required, if determined by Model Community to be necessary for sustaining surrounding exceptional and high quality native upland plant community areas.
4. **Other Areas with Native Upland Plant Community Designations** - Development is regulated in the following manner:
   a. **Protection of Moderate Native Upland Plant Communities** - No more than fifty percent (50%) of the areas rated, on the native upland plant communities map, as moderate native upland plant community areas shall be cleared or graded for development or infrastructure.
   b. **Exceptions** - Model Community may allow more than fifty percent (50%) of the moderate native upland plant communities to be developed if restoration of remaining areas is completed and connectivity is maintained between exceptional and high quality vegetation areas or to the corridor system.

Delineation Required - MLCCS criteria

The Minnesota Land Cover Classification System (MLCCS) is an established hierarchy for categorizing natural resources. At the most general level, land cover is divided into either "natural/semi-natural" or "cultural" cover types. Within these cover types there are five hierarchical levels with increasing levels of detail about the land cover.

The natural/semi-natural classification system is a hybrid of the National Vegetation Classification System (NVCS) and the Minnesota Natural Heritage plant communities.

The cultural classification system is designed to identify built-up/vegetation patterns and an area's imperviousness to water infiltration.

The Department of Natural Resources, working with local governments, has completed MLCCS inventories for most of the metropolitan area. Inventories have also been completed for some areas in Greater Minnesota.

For more information on the MLCCS definitions and process, go to: http://www.dnr.state.mn.us/mlccs/index.html.

Buffers for Small Stands or Remnants

Establishing a minimum buffer prevents buildings from encroaching into the exceptional and high quality vegetation areas, while allowing some 'edge' habitat to help sustain many of the savanna and prairie remnants.

Rating Native Upland Plant Communities

Communities vary in their terminology and rating criteria for these ecological systems. Several Minnesota examples include the City of Shakopee, City of Duluth, Washington County. Ratings tend to be three or four qualitative categories such as low, moderate, high, and exceptional quality, or having good, better, best quality. Each community should determine how best to rate their natural resources and adjust the language accordingly in the performance standards. The ranking language (i.e. exceptional, high, moderate, low) should be consistent across all of the natural resource evaluations.

Conservation Easements Required

Conservation easements are the optimal means of permanent protection. However, an acceptable legal entity must be available to accept and hold conservation easements - homeowners' associations for-profit entities, or individuals cannot hold a conservation easement under state law. Some non-profit organizations will accept such easements but may require a management fee. Government agencies can also accept easements, but need to have staff who can manage the easement over time. Each community needs to consider whether and how to use conservation easements as a protection tool.

5. **Restoration** - Restoration of native upland plant community areas, consistent with the habitat restoration standards of the Minnesota Department of Natural Resources, is highly encouraged in the following areas.
   a. Low to moderate quality native upland plant community sites, as mapped on Model Community's native upland plant communities map.
   b. All vegetated areas connecting exceptional and high quality upland, wetland, or shoreland vegetation areas within the corridor system.
   c. Edge habitat areas and buffer areas around exceptional and high quality native upland plant community areas.
6. **Conservation Easements Required** - Conservation easements shall be placed and signed accordingly on delineated exceptional and high quality native upland plant community areas that are required to be protected under this performance standard.

III. Performance Standards for Wildlife

A. Purpose and Goals

1. **Protect Wildlife Habitat and Corridor Systems** - The primary purpose of the wildlife standards is to protect wildlife habitats and corridors where proposed or existing development presents a risk to areas associated with the survival of wildlife species in the community. The performance standards are also designed to allow restoration efforts to take place and to provide for connection of isolated habitat areas.
2. **Consistency with Comprehensive Plan** - Model Community's natural resources and greenways should provide a diversity of natural communities and associated wildlife, consistent with the following Comprehensive Plan goals:
   a. Preserve, protect, or restore ecosystems essential to sustain Model Community's native wildlife.
   b. Create greenways throughout the community for trails, connecting habitat, sustaining wildlife, and providing recreation activities for residents.
3. **Ecosystem Perspective** - These performance standards adopt the perspective of ecosystem management: The whole system is greater than the sum of all its parts. Development and protection decisions need to be based on understanding the inter-relationship of ecosystem components (woodlands, endangered species, wetlands, slopes, etc.). Individual components of the ecosystem, also referred to as green infrastructure, must frequently be connected in order to function appropriately, just as the individual components of the water, wastewater, and transportation systems must be connected in order to function.
4. **Integrate Development** - These performance standards are designed to integrate new development with Model Community's remaining natural wildlife areas, and to ensure that these areas continue to function as wildlife habitat into the future.

Fragmentation

"Habitat fragmentation significantly reduces wildlife populations and diversity. When wildlife is contained to small, isolated patches of habitat, resources required for survival such as food, water, cover and mating opportunities become scarce. Depending on the extent of fragmentation, populations can become unstable and entire species can disappear from a region."

Source: Bond, Monica. 2003. Principles of Wildlife Corridor Design, Center for Biological Diversity.

Corridors and Connections

"Wildlife abundance and diversity within corridors is positively correlated with the width of corridors. Wider corridors provide more interior habitat and greater protection from human disturbances and predators."

"Interconnected networks of corridors allow the fullest range of wildlife movement. Ideally, corridors should extend across a topographical gradient, i.e. from river bottom to ridge top, to connect the widest variety of local microhabitats. This configuration is especially important for wildlife that migrates between different types of habitat throughout their lifecycles."

Source: Lindenmayer, B. and J. Franklin. 2002. Conserving Forest Biodiversity: A Comprehensive Multiscaled Approach.

Applicability - Links to Permits

The applicability of these standards is linked to the issuance of other permits, in this case grading, development permits, or subdivision permit. Alternatives for communities to consider include:

1) Assessing the permit application and review process already used in the community and limiting the standards to only those permits where the risk to the resource is greatest, and;

2) Not linking the standards to a specific permit but applying them to all management actions where the resource exists. The latter of these is a genuine performance standard approach, but requires a greater enforcement commitment by the community.

Applicability - Mapped Areas

The model ordinance language assumes that the community has identified wildlife areas and conceptual corridor connections (or corridor search areas) prior to adopting the ordinance. The community can, instead, use county biological survey sites, other DNR wildlife or corridor designations, county assessments, Soil and Water Conservation District priorities, or other agency designations. Designating corridors can be conceptual, leaving the final connection path dependent on development patterns.

B. **Applicability** - All applications for a grading, development, or subdivision permit must comply with these standards. The geographic areas where the standards apply include the following:

1. **Priority Wildlife Areas** - Wildlife areas as mapped and rated in Model Community's natural resource assessment.
2. **Connection Areas** - Connections between exceptional or high quality wildlife areas as identified on the green corridor system.

C. **Criteria for Standards** - The minimum performance standards for exceptional and high quality wildlife areas include the following :

1. **Protect Habitat Function** - Protect the habitat function of areas identified as exceptional or high wildlife areas by Model Community.
2. **Ensure Barrier-Free Movement** - Ensure barrier free movement between wildlife areas within Model Community's corridor system.

D. **Minimum Performance Standards for Wildlife Areas** - Following are the minimum performance standards that shall apply to the designated categories of wildlife.

1. **Site Survey Required** - Where the development site includes or abuts an area identified as exceptional or high wildlife habitat by Model Community a habitat site survey shall be conducted. The site survey shall identify the following:
   a. Species likely to utilize the habitat, and;
   b. Necessary conditions to maintain the habitat function for species sustainability including protection of core area and edge vegetation or additional configurations (i.e., buffers, corridor widths) and any other functions specific to sustaining the wildlife species' habitat community.
2. **Protect Functioning of Delineated Areas** - Site configuration, preparation, and development must protect the site as wildlife habitat area as identified in the habitat site survey. In order to protect the habitat functions, site configuration, preparation or clearing, and development shall:
   a. Maintain a diversity of habitat by preserving the range of existing foliage height including ground covers, shrubs and trees;
   b. Incorporate habitat buffers to the designated wildlife area, and identify provisions for maintaining the habitat buffer over time. The habitat buffer shall:
      i. Be a minimum of 40 feet wide, unless otherwise identified in the habitat site survey.
      ii. Be consistent with the edge habitat conditions identified in the habitat site survey, such as the need for native vegetation of differing heights, including grasses, shrubs and trees.

c. Minimize the amount of area within the habitat buffer that is converted to lawn from existing vegetation.

3. **Barrier-Free Movement Required** - The subdivision of any land with exceptional or high wildlife habitat shall make provisions for barrier-free movement of wildlife across the site and maintain barrier-free movement to Model Community's corridor system abutting the development site.

   a. Road and other above ground infrastructure shall not cross corridors unless mitigating steps, meeting the approval of Model Community and consistent with the findings of the habitat site survey, are taken.

   b. Corridors connecting wildlife habitat areas shall be a minimum of 100 feet wide. Additional width may be necessary if warranted by the species associated with the habitat site survey.

   c. Corridors shall be marked with signage indicating that the area should not be disturbed and vegetation should not be cut.

4. **Lighting** - Artificial lighting shall be fully shielded and directed so as not to shine into the wildlife area or associated connecting corridor.

5. **Conservation Easements** - Conservation easements on habitat areas or corridors within the corridor system may, at the discretion of Model Community, be required as a condition of subdivision approval.

Barrier-free Movement Required

Fences and roads are barriers to wildlife movement. Corridors should not be directed across roads, and new roads should not cross corridors or should accommodate wildlife movement. Night lights can also represent a barrier to wildlife movement. Night time yard and street lights shall be directed away from corridors.

IV. Performance Standards for Steep Slopes and Bluffs

A. Purpose and Goals

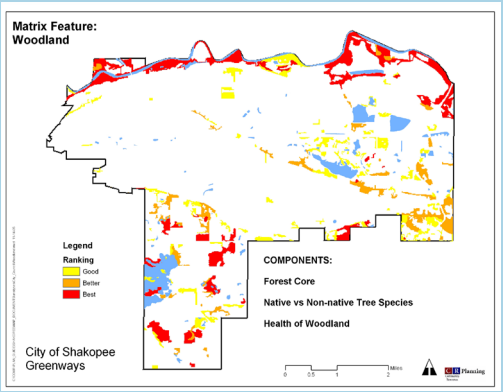
1. **Protect Steep Slopes and Bluffs** - The primary purpose of the steep slope performance standards is to protect areas in Model Community where proposed or existing development near steep slopes present a risk to Model Community's prominent natural features that not only shape Model Community's community character, but provide natural resources in or adjacent to bluff and steep slope areas and protect the long-term viability of housing and infrastructure.
2. **Consistent with Comprehensive Plan** - Undeveloped steep slopes and bluffs are visually appealing, very susceptible to erosion when disturbed, and costly to develop. Risks associated with steep slopes and bluff shall be mitigated, consistent with the following Comprehensive Plan goals:
   a. Establish guidelines to minimize the negative impacts on natural resources, recreational opportunities, and aesthetic views of steep slopes and bluffs within Model Community.
   b. Limit erosion on steep slopes, bluffs, and in shoreland areas through use of natural buffers and appropriate development setbacks.
3. **Slope and Bluff Priorities** - The primary elements of risk associated with development on bluffs and steep slopes are the visual and character impacts from losing prominent natural features and views, and the physical impacts to the bluff and slopes. Physical impacts include soil erosion, increased velocity and volume from stormwater runoff into adjacent waterways, loss of habitat, and difficulty and increased cost of installing infrastructure and buildings on steep slopes.

Comprehensive Plan Language

Place reference policy or goal language from Model Community's Comprehensive Plan in place of language provided.

Example of Steep slope areas in the City of Shakopee

A map of steep slopes and bluffs might show the location of steep slopes and bluffs based on contour data, length of slope, and native species as identified by the City or County or State's inventory (i.e., County Biological Survey), and highly erodible lands as identified by the County's soils survey. Other functions may also be included. The ranking characteristics using these functions will vary from community to community. Below is an example from the City of Shakopee's slope rankings map.



B. **Applicability -** All grading, development, or subdivision permits in the following areas must comply with the performance standards. All vegetative clearing activities on bluffs or bluff impact zones must be consistent with the ordinance.

1. **Steep Slopes Map** - All slope areas identified on Model Community's map are subject to the standards
2. **Slopes Greater than 10%, Highly Erosive Soils** - All areas with slopes greater than 10% or slopes with highly erosive soils, as identified on the County soils survey are subject to the standards.

C. **Criteria for Standards** - The minimum performance standards for steep slopes are created to meet the following criteria:

1. **Erosion, Landslides, Sedimentation** - Prevent erosion and landslides, limit increased sedimentation and impacts to water quality.
2. **Aesthetic Integrity** - Maintain the aesthetic integrity of a community by protecting hillsides and ridgelines.
3. **Protect Habitat** - Protect habitat that needs undisturbed slopes to allow for propagation and sustainability of plant or animal communities.
4. **Minimize Maintenance and Replacement Costs** - Ensure that development of infrastructure on slopes minimizes long-term maintenance or replacement costs.

D. **Minimum Steep Slope Performance Standards** - Following are the minimum performance standards that shall apply to steep slope areas:

1. **Slopes** - In all zones, slopes in excess of 10% shall be protected or incorporated into new development or infrastructure so as to limit erosion, manage stormwater runoff, and protect natural features using best management practices (BMPs).
2. **Bluffs (slopes at or greater than 18%)** - Development is regulated in the following manner:
   a. **Development Prohibited** - No development or vegetative clearing is allowed on any land with a slope greater than 18%, except for vegetative restoration under a vegetative management plan approved by Model Community
   b. **Protection of Prominent Natural Features** - Within the bluff impact zone:
      i. All buildings are excluded.
      ii. Vegetative clearing is prohibited except for vegetative restoration that is described in a vegetative management plan approved by Model Community.

Slope of the land and buffer effectiveness

The slope of the land on either side of a water body is very significant in determining effectiveness of the buffer in trapping sediment and retaining nutrients. The steeper the slope, the higher the velocity of overland flow and the less time it takes nutrients and other contaminants to pass through the buffer. Slope is a variable in virtually all models of buffer effectiveness and should definitely be included in a formula for buffer width (A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation. Seth Wenger. Institute of Ecology, University of Georgia. Revised March 1999).

Scenic and character protection

Prominent natural features, including bluffs and steep slopes, define the character of adjacent natural areas and neighborhoods. Steep slopes and bluffs are frequently prominent components of the public viewshed. Bluffs and steep slopes abutting and upland of public lands or waters should have a combination of setbacks, screening requirements including protection of native vegetation within the buffer area, and architectural design preferences to address the impact of development on the character of communities and natural areas (Regulating Development on Steep Slopes, Hillsides, and Ridgelines. Lakes Region Planning Commission. 2005. Meredith, NH, www.lakesrpc.org; National Park Service, 1995; City of St. Paul, 2006)

iii. Conservation easements shall be placed on bluff areas and bluff impact zones, and signage shall identify the edge of the conservation easement.

iv. Buildings on slopes greater than 10% that are uphill from the bluff impact zone shall be designed and positioned so as to blend into the slope rather than sit on top of the slope.

3. **Slopes Between 10 and 18%** - Development is regulated in the following manner:

   a. **Highly Erosive Soils** - No development is allowed on any slope equal to or greater than 10% if highly erosive soils are present on the slope.

   b. **Low to Moderately Erosive Soils** - Where soils are low to moderately erosive, the following standards shall be met:

      i. Impervious surfaces shall be limited to 20% of the slope area.

      ii. Non-native vegetation shall be limited to 20% of the slope area,

      iii. Stormwater from each building lot must be infiltrated on the lot for a half-inch 24-hour rain event.

      iv. All roads, driveways, and sewer systems shall utilize best management practices consistent with The Minnesota Stormwater Manual (http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html).

   c. **Shoreland and Wetland Areas** - Minimum buffers and setbacks around all waterbodies shall be extended by 25 feet for a slope at least 50 feet in length and greater than 10%. Site stormwater runoff shall be infiltrated or stored to maintain the 1.5 year bankfull flow for perennial and intermittent stream courses.

   d. **Protection of Prominent Natural Features** - Steep slope areas where slope length is more than one eighth-mile are ridgeline/viewshed protection areas. Ridgeline/viewshed protection areas shall be subject to the following minimum standards:

      i. All buildings and infrastructure other than driveways must be designed so as to blend into the slope rather than sit on top of the slope, consistent with subsection D.5.

      ii. All exceptional and high quality native vegetation, as identified in the Minnesota Land Cover Classification System (MLCCS) shall be protected.

Exceptional, High, Moderate, Low Quality

These standards reference "high", "moderate" and "low" quality sites. Such designations must be defined in the community's NRI/NRA or in the Comprehensive Plan.

Alternatively, the community can use the quality standards embedded in the MLCCS inventory, to the extent that the specific resource (e.g. Native Upland Plant Communities) matches the MLCCS cover types. The MLCCS has criteria for assessing qualitative rankings. While judgement always comes into play, these rankings have been demonstrated to be reliable and consistently applied.

4. **Slopes Less than 10%** - Development is regulated in the following manner:
   a. **Highly Erosive Soils** - Where soils are highly erosive, no more than 50% of the slope area shall be cleared or developed. In addition, all the following provisions should be met:
      i. BMPs for the installation of roads, driveways, and sewer systems on should be consistent with standards for slopes with highly erosive soils as described in *The Minnesota Stormwater Manual (http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html).*
      ii. Developments that install infrastructure in highly erosive soils must develop management plans and provide for on-going maintenance funding to reduce the potential high cost for public expenditure of infrastructure maintenance.
      iii. Required buffers around waterbodies will be extended based on slope grade and length of slope area. Developments should infiltrate or provide water storage to maintain the bankfull flow for perennial and intermittent stream courses for a 1.5-year storm.
   b. **Low to Moderately Erosive Soils** - Where soils are low to moderately erosive, no additional practices are required to the general development requirements described in this ordinance, except as described in other Model Community ordinances (i.e., shoreland overlay, stormwater management).
5. **Building Design Considerations** - Buildings on slopes exceeding 10% and longer than one-eighth of a mile shall be designed to blend into the slope. Design considerations include the following:
   a. Locate and design buildings so that they do not loom over the bluff
   b. Break up building mass using methods such as broken planes, varying rooflines, stepping back (from the downhill perspective) of upper stories, minimizing mass near waterbodies, etc.
   c. Use materials that blend with the setting; avoid the use of reflective materials.
   d. Use suitable colors; subtle, subdued colors are best as they blend in with the natural surroundings.
   e. Buildings within 50 feet of the bluff impact zone, and within 100 feet from the top of a steep slope should not exceed 30 feet in height. Buildings higher than 40 feet should be set back from the bluff impact zone an additional 25 feet (see definition for bluff and bluff impact zone).